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METHODS FOR INCREASING FOOD VALUE OF FLOUR CONFECTIONERY GOODS

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The article examined the use of composite flour in the production of flour confectionery. With the addition of flour of composite mixtures to sugar cookies, protein content increases on average by 4.5%, fat by 17.2%, calcium by 13%, magnesium by 40.4%, and the amount of carbohydrates decreases by 4.33% and energy 24 kcal value compared to control. Due to the essential amino acids, vitamins, microelements and other useful substances contained in chickpea and oats, the sugar cookies obtained from composite mixtures can be recommended for therapeutic and preventive nutrition, which will expand the range of functional confectionery products.

Keywords: flour, mixture, confectionery, sugar cookies, food value.

ҰНДЫ КОНДИТЕР ӨНІМДЕРІНІҢ ТАҒАМДЫҚ ҚҰНДЫЛЫҒЫН ЖОҒАРЫЛАТУДЫҢ ӘДІСТЕРІ

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Мақалада ұнды кондитер өнімдерін өндіруде композитті қоспалардың ұнын қолдану қарастырылды. Қантты печеньеге композитті қоспалар ұнын қосқаннан құрамындағы ақуыздың мөлшері бақылау үлгісімен салыстырғанда орташа есеппен 4,5%-ға, май 17,2%-ға, кальций 13%-ға, магний 40,4%-ға жоғарылайды, сондай-ақ көмірсулардың мөлшері 4,33%-ға және энергетикалық құндылығы 24 ккал-ға төмендейді. Нұт пен сұлының құрамында ауыстырылмайтын аминқышқылдары, дәрумендер, микроэлементтер және басқа да пайдалы заттар болғандықтан, композитті қоспалардан алынған қантты печенье ендік-профилактикалық тамақтану үшін ұсынуға болады, ол функционалды бағытта ұнды кондитер өнімдерінің ассортиментін кеңейтуге мүмкіндік береді.

Негізгі сөздер: ұн, қоспа, кондитерлік өнімдер, қант печеньесі, тағамдық құндылығы.

МЕТОДЫ ПОВЫШЕНИЯ ПИЩЕВОЙ ЦЕННОСТИ МУЧНЫХ КОНДИТЕРСКИХ ИЗДЕЛИЙ

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В статье рассматривается использование муки композитных смесей в производстве мучных кондитерских изделий. С добавлением муки композитных смесей в сахарное печенье

содержание белка увеличивается в среднем на 4,5%, жира на 17,2%, кальция на 13%, магния на 40,4%, а также понижается количество углеводов на 4,33% и энергетическая ценность на 24 ккал по сравнению с контрольным образцом. Благодаря содержащимся в нуте и овсе незаменимых аминокислотам, витаминам, микроэлементам и другим полезным веществам, полученное сахарное печенье из композитных смесей можно рекомендовать для лечебно-профилактического питания, которое позволит расширить ассортимент мучных кондитерских изделий функционального назначения.

Ключевые слова: мука, смесь, кондитерские изделия, сахарное печенье, пищевая ценность.

Introduction

The confectionery industry is a food industry. It produces foods of high calorie and digestibility.

Currently, active work is underway on the production of bakery and flour confectionery products of high nutritional value using an unconventional type of raw material. Various mixtures are offered, which include vitamins, proteins, minerals that enrich bakery and flour confectionery. They change the properties of the dough and product, often worsening organoleptic and physico-chemical characteristics. An urgent task is to develop the composition and methods of using composite mixtures based on domestic natural raw materials to increase nutritional value, improve product quality [1,2].

Biscuits broadly fall into four categories, distinguished by their recipes and process: crackers, hard sweet and semi-sweet biscuits, short-dough biscuits and cookies (including filled cookies). Each category and each product type require a particular mixing, forming and baking process.

The main ingredients for biscuit making are flours, sugars and fats. To these ingredients, various small ingredients may be added for leavening, flavour and texture.

The principle ingredient of biscuits is wheat flour. The grain consists of bran (12%), which is the outer husk; endosperm, the white centre (85,5%); and tiny germ (2,5%). Typical biscuit flour is milled to a yield or extraction of 70-75%. Whole-meal flour is of 100% extraction, and wheat meal flours in between these extraction rates are normally around 84% extraction. The flour will also contain moisture of between 13% and 15%. The wheat flour is composed of carbohydrate (as starch), protein and fat, together with some fibre, ash and trace minerals and vitamins. The protein is mainly gluten, composed of gliadin and glutenin. The percentage of protein determines the flour strength. A dough made from strong flour with a high protein content is extensible and can be machined into a continuous sheet for crackers

and hard biscuits. A weak flour with a low-protein content produces a short dough that may be moulded or a soft, high-fat dough that may be deposited on the baking band and when baked gives a soft, tender cookie [3].

Objects and methods of research

The objects of study are composite mixtures for confectionery products, including sugar cookies from wheat flour of the 1st grade, oat and chickpea flour.

Oatmeal and chickpea flour are good sources of protein, lipids, they contain more important essential amino acids and other beneficial substances than wheat flour. The composition of oats includes beta-glucan - soluble dietary fiber (soluble fiber). As proven by clinical studies, soluble fiber helps lower cholesterol and also slows down blood sugar levels. The high fiber content makes oats indispensable in the prevention of cardiovascular disease, diabetes and overweight. Chickpea flour is the first among all leguminous crops in terms of selenium content, which enhances the body's resistance to cancer.

The following modern methods and standards were applied in the study: GOST 15810-96 "Gingerbread confectionery. General specifications", GOST 5899-85 "Confectionery. Methods for the determination of fat", GOST 5900-73 "Confectionery. Methods for the determination of moisture and dry matter", GOST 5901-87 "Confectionery. Methods for the determination of ash and impurities", GOST 5903-89 "Confectionery. Methods for the determination of sugar", GOST 26929-94 "Raw materials and food products. Sample preparation. Mineralization to determine the content of toxic elements", GOST 10846-91 "Bread and bakery products. Method for determination of protein" and others.

Results and their discussion

The aim of the study is to develop formulations of composite mixtures for confectionery from wheat flour of the 1st grade, oat and chickpea flour.

The amount of fat in chickpea flour is 3.7 times that of wheat. Due to the presence of fatty acids (the most important of which are linoleic and oleic), cholesterol levels, the risk of blood clots, the development of cardiovascular diseases and atherosclerosis are reduced [4, 5].

It was necessary to solve the following particular problems: to analyze the chemical

composition of the raw materials, to make composite mixtures of these components, to assess the impact of the proposed composite mixtures on the quality of products.

Initially studied the chemical composition of the raw materials (table 1):

Table 1 – The chemical composition of non-traditional types of raw materials, g.

Type of raw materials	Water	Proteins	Fats	Carbohydrates	Ash
Wheatflour: 1st grade	13,8	10,7	1,4	68,9	0,8
Chickpea	12,6	19,9	4,9	49,7	3,1
Oat	13,0	12,6	6,5	36,5	1,9

From the data in table 1 it can be seen that the highest protein content in chickpea flour is 19.9 g, in oat flour - 12.6 g, and in wheat flour of the first grade - 10.7 g [6].

To assess the effect of composite mixtures on the quality of products, laboratory test baking was performed. For the preparation of the dough, the basis for control was selected sugar cookie recipes (g): wheat flour 1st grade - 100; starch - 7; icing sugar - 33; molasses - 4.5; margarine - 25; salt - 0.75; baking soda - 0.7; ammonium carbonate - 0.3 [7].

A composite mixture was introduced into the test samples in the dosage: 1st grade wheat flour - 60%, oat - 20%, chickpea - 20%. Emulsions for cookies were prepared by mixing the components in a certain sequence: water with dissolved salt, icing sugar, molasses, softened margarine. The components were mixed vigorously with a mixer at a speed of 180 rev/min. After that,

chemical disintegrates were added, again they were blown with a mixer. Starch and flour were dosed last. The resulting dough was rolled into a layer, dough pieces were molded and baked for 4-6 minutes. at a temperature of 250-260°C. In the finished products were determined by such indicators as: humidity, alkalinity, wetness.

Based on the studies for the prototypes using a composite mixture and wheat flour of the 1st grade, the optimal ratios are established. The best product quality was observed when making a composite mixture in the amount of 60, 20, 20 %. According to the results of test laboratory baking, it was revealed that products with these mixtures had the required organoleptic characteristics: a satisfactory appearance, a given shape and surface is characteristic of sugar cookies, a pleasant appearance in a break. The absorbency of cookies was 186-194%.

Table 2 – Nutritional and energy value of sugar cookies

Показатели		Chemical composition	
		From wheat flour 1st grade	With a composite mixture
Proteins, g		8,93	9,75
Fats, g		12,26	16,48
Carbohydrates, g		70,06	65,73
Moisture, g		7,89	6,85
Ash, g		0,86	1,19
Minerals, mg	calcium	69+13,8	87,0+17,4
	magnesium	21+4,2	38,0+7,6
Energyvalue, kcal		450	426

From the data of table 2 it is seen that when making composite mixtures, the amount of protein increases on average by 4.5%, fat by 17.2%, and also minerals: calcium by 13%,

magnesium by 40.4% compared with the control, while carbohydrates by 4.33%, the energy value of products is reduced by 24 kcal.

In addition, due to the introduction of composite mixtures, the amount of carbohydrates in the product decreases and the energy value decreases. Such a product is in demand in view of the relevance of the problem of reducing the calorie content of flour confectionery.

Conclusion

The use of composite mixtures can satisfy the daily human need for vitamins and minerals. The results obtained indicate the feasibility of using flour from composite mixtures in the production of flour confectionery. Due to the essential amino acids, vitamin, microelements and other useful substances contained in chickpeas, oats, the obtained products can be recommended for therapeutic and preventive nutrition, which will expand the range of functional confectionery products.

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